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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/090,864	03/04/2002	Steven Don Arnold	H0001505	7819

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03/14/2003

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EXAMINER

TRIEU, THAI BA

ART UNIT	PAPER NUMBER
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3748

DATE MAILED: 03/14/2003

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/090,864

Applicant(s)

ARNOLD, STEVEN DON

Examiner

Thai-Ba Trieu

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 5-10 and 17 is/are allowed.
- 6) ☒ Claim(s) 1-4 and 11-15 is/are rejected.
- 7) ☒ Claim(s) 16 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). ____
- 2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4. 6) ☐ Other: ____

DETAILED ACTION

Claim Suggestions

Claims 16-17 are suggested to applicant because of the following minor informalities:

- In claim 16, line 1, "*reciyed*" before "*in claim 15*" should be replaced by **--recited--**.
- In claim 17, line 8, **-- and --** should be inserted after "*therein*;"

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-3, 11-13 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Swearingen (Patent Number 3,495,921), in view of Selig (Patent number 6,503,058).

Swearingen discloses a variable geometry turbocharger assembly comprising:

- a turbine housing (12) having
 - an exhaust gas inlet and an outlet (14 and 16),
 - a volute connected to the inlet, and
 - a nozzle wall adjacent the volute (See Figure 1);

a turbine wheel (20) carried within the turbine housing (12) and attached to a shaft (22);

a plurality of vanes (34) disposed within the turbine housing (12) between the exhaust gas inlet and turbine wheel, each vane comprising:

- an inner airfoil surface (Not Numbered) oriented adjacent the turbine wheel (See Figures 1-3);

- an outer airfoil surface (Not Numbered) oriented opposite the inner airfoil surface (See Figure 1-3), the inner and outer airfoil surfaces defining a vane airfoil thickness (See Figure 3);

- a leading edge positioned along a first inner and outer airfoil surface junction (See Figures 3 and 8);

- a trailing edge positioned along a second inner and outer airfoil surface junction (See Figures 3 and 8); and

- a hole disposed within a first axial vane surface substantially parallel to the nozzle wall for receiving a respective post (50) therein, said post projecting from the nozzle wall towards the turbine wheel (20) (See Figures 1-3 and 8);

- wherein the inner airfoil surface comprises a convex surface portion and a concave surface portion moving from the vane leading edge to the vane trailing edge (See Figures 1-3).

However, Swearingen fails to disclose the vane thickness-to length ratio.

Selig teaches that it is conventional in the airfoil configuration art, to utilize the vane having an airfoil thickness that is greater than about 0.16 times a length of the vane as measured between the vane leading and trailing edges; and an airfoil thickness being in the range of from about 0.16 to 0.50 times the length of the vane (See Abstract, and Column 10, lines 55-62).

It would have been obvious to one having ordinary skill in the art at that time the invention was made, to have utilized the vane thickness-to-length ratio being greater than about 0.16 in the range of from about 0.16 to 0.50; as taught by Selig/Liu, to maximize structural integrity as well as to maximize the flow efficiency, in the Swearingen turbocharger device.

Claims 4 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Swearingen (Patent Number 3,495,921), in view of Selig (Patent number 6,503,058), and further in view design choice.

The modified Swearingen discloses the invention as recited above; however, fails to disclose the ratio of a convex surface having a radius of curvature to the vane length being less than 0.8.

One having an ordinary skill in the airfoil art, would have found the ratio of a convex surface having a radius of curvature to the vane length being less than 0.8 as a matter of design choice depending on aerodynamic efficiency. Moreover, there is nothing in the record, which establishes that the claimed pressure ratio of the compressor, presents a novel or unexpected result (See *In re Kuhle*, 526 F. 2d 553, 188 USPQ 7 (CCPA 1975)).

Allowable Subject Matter

Claims **5-10 and 17** are allowed.

Claim **16** is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: The Prior art fails to disclose or render the claimed combination including:

Regarding claim 5:

a hole disposed within a first axial vane surface substantially parallel to the nozzle wall for receiving a respective post therein, said post projecting from the nozzle wall towards the turbine wheel; and

an actuation tab extending from a second axial vane surface opposite from the first vane surface;

wherein the vane inner airfoil surface comprises a convex surface adjacent the leading edge and a concave surface adjacent the trailing edge, and wherein the vane airfoil thickness is in the range of about 0.16 to 0.50 times the vane length as measured between the leading and trailing edges; and

means for engaging each vane tab and rotating the vanes in unison within the turbine housing.

Regarding claim 8:

a hole disposed within an axial vane surface positioned substantially parallel to the integral outer nozzle wall, each vane hole accommodating placement of a respective post therein for providing pivoting vane movement, each vane further comprising an elongated actuation tab extending outwardly from an axial vane surface opposite from the holes;

an annular unison ring disposed within the turbine housing and positioned axially adjacent the axial vane surface of each vane providing the actuating tabs, the unison ring having a plurality of slots to accommodate a respective vane tab therein, wherein each slot is configured to provide non-rotating sliding movement of a respective tab therein; and

means for rotating the unison ring within the turbine housing along an axis running through the shaft, wherein rotation of the ring causes the tabs to slide within respective slots and cause the vanes to move radially inwardly or outwardly relative to the shaft, such radial vane movement being facilitated by the pivoting action of each vane about a respective post.

Regarding claim 17:

a hole disposed within a first axial vane surface substantially parallel to the nozzle wall for receiving a respective post therein; and

an actuation tab extending from a second axial vane surface opposite from the hole;

wherein the vane has an airfoil thickness that is greater than about 0.16 times a length of the vane as measured between the vane leading and trailing edges, and

wherein the outer airfoil surface comprises a convex surface having a radius of curvature that is less than about 0.8 times a length of the vane."

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- Engels et al. (US Patent Number 4,770,603) disclose an exhaust gas turbocharger.
- Swearingen (US Patent Number 4,242,040) discloses a turbo-expander or a compressor having a clamping ring for a plurality of adjustable blades.
- Hunter (US Patent Number 2,976,013) discloses a turbine construction.
- Thompson (US Patent Number 2,392,200) discloses a centrifugal compressor having a pin axially projecting from the tongue of each wedge/blade.
- (US Patent Number) discloses.
- Berg (US Patent Number 4,657,476) discloses a variable area turbine.

- Tangler et al. (US Patent Number 5,417,548) disclose an airfoil configuration for wind turbine.
- Tangler et al. (US Patent Number 5,562,420) disclose airfoils for wind turbine having a thickness in the range of 16%-24%, and a blade length in the range of 1-5 meters or 5-10 meters.
- Perry (US Patent Number 4,668,169) disclose a helicopter rotor blade having a thickness to chord ratio of the inboard region being greater than 18% and increasing towards the root end to about 24%.
- Bingham (US Patent Number 4,459,083) discloses shapes for rotating airfoils with an upper surface having a general reduction in the surface slope back to the maximum ordinate being about 40% of the airfoil chord.
- Tran (Patent Number 5,035,578) discloses a blade for a steam turbine with a convex surface having a continuously increasing radius of curvature.
- Tran (Patent number 5,017,091) discloses a turbine blade with a convex surface having a radius of curvature increasing constantly from the leading edge to the trailing edge, which allows the flow to decelerate up to the blade throat and remain constant in the region downstream of the throats.
- Phillips (Patent Number 3,697,193) discloses a fluid-foil section.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thai-Ba Trieu whose telephone number is (703) 308-

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6450. The examiner can normally be reached on Monday - Thursday (6:30-5:00), every Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas E. Denion can be reached on (703) 308-2623. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9302 for regular communications and (703) 872-9302 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0861.

TTB
March 12, 2003



Thai-Ba Trieu
Patent Examiner
Art Unit 3748



THOMAS DENION
SUPERVISORY PATENT EXAMINER
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